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EXAMINER	
RUTTEN, JAMES D	

ART UNIT	PAPER NUMBER
2192	

DATE MAILED: 06/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/560,269	NOLTE, BARRY M.	
	Examiner	Art Unit	
	J. Derek Rutten	2192	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 April 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5,7-16,20,22-31,35 and 37-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 5, 7-16, 20, 22-31, 35, 37-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to Applicant's submission filed 4/4/06, responding to the 1/4/06 Office action which rejected claims 1, 4-16, 19-31, and 34-45. Claims 1, 5, 7, 12-14, 16, 20, 22, 27-29, 31, 35, 37, and 42-44 have been amended, claims 2-4, 6, 17-19, 21, 32-24, 36, and 46-51 have been canceled. Claims 1, 5, 7-16, 20, 22-31, 35, and 37-45 remain pending in the application and have been fully considered by the examiner.

Response to Amendment

2. Applicant's arguments with respect to claims 1, 12, 16, 27, 31, and 42 have been considered but are moot in view of the new grounds of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 1, 5, 7-16, 20, 22-31, 35, and 37-45 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. Maintaining the "probe location at a position in the calling function where the second called function returns after execution" in the set of probe locations, critical or essential to the practice of the invention so that "eliminating one member of the probe location pair" can be achieved, but not included in the claims is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

Applicant's amendment filed 4/4/06 has introduced new claim limitations which are essentially summarized with respect to claim 1 as a first, second and third function, where the first function calls the second function which calls the third function, and with probe locations at the beginning and end of the first and second functions, at the beginning only of the third function, and surrounding the call to the second function. An interpretation of claim 1 results in the following pseudo-code representation:

```
main {
      Probe_loc1;
      …
      Probe_loc5;        PAIR1
      Call Function1();
      Probe_loc6 (Equivalent to Probe_loc8);    PAIR2
      …
      Probe_loc2;
}

Function1 {
      Probe_loc3;        PAIR1
      …
      Call Function2();
      …
      Probe_loc4;        PAIR2
}

Function2 {
      Probe_loc7;
      …
}
```

Claim 1 then continues by finding a pair of redundant "probe locations" and eliminating one member of the pair. This arrangement appears to be directed towards the "tail merge" scenario which is described on page 10 line 25 through page 11 line 26 of the originally filed specification, since the language "at a position in the calling function where the second called function returns after execution" is used. The tail merge scenario as described in the specification and shown in Fig. 4 returns directly from Function2 to the main function since there

are no instructions following the call to Function2 from Function1. As described in the specification, elimination of the "_ReturnFromFunction probe" would result in ambiguity in attributing time to the correct functions, and therefore a probe should remain inserted (see specification page 11 lines 11-12 and 23-24). In the above pseudo-code, `Probe_loc8` corresponds to the "_ReturnFromFunction" location, and should therefore remain in the set of probe locations and *not eliminated.* However, the claim merely calls for "eliminating one member of the probe location pair" from the set of probe locations, but does not recite the essential step of removing the location corresponding to `Probe_loc8` from consideration, in conjunction with the elimination of "one member of the probe location pair". That is to say, `Probe_loc8` should not be subject to elimination. The claim does not provide for an exception for `Probe_loc8`, and this would result in an ambiguous attribution as described in the specification. Independent claims 12, 16, 27, 31, and 42 contain similar language and are rejected for the same reasons set forth above. Also, dependent claims 5, 7-11, 13-15, 20, 22-26, 28-30, 35, 37-41, and 43-45 are rejected as being dependent upon rejected base claims. For the purpose of further examination, these claims will be interpreted as written.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1, 5, 7-16, 20, 22-31, 35, and 37-45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 contains the following clause:

> **when** the first called function calls the second called function and **when** the second called function returns to the calling function, a probe location at a position in the calling function where the second called function returns after execution [emphasis added]

This clause appears to suggest that the probe location only exists temporally when the second called function returns to the calling function after being called by the first called function. However, this limitation is unclear since the notion of temporal execution dynamic execution of the functions at runtime, while probe locations are conceptually understood to exist statically in portions of program code and are independent from any particular runtime execution of the program code. In other words, the scope of the claim is not clear since this language could be interpreted to be referring to a particular running instance of the program, or it could simply be referring to an abstract control flow analysis of the program code representation. Also, this language contrasts with other language present in the claim such as "*...a position in the calling function **where** the calling function calls...*" Independent claims 12, 16, 27, 31, and 42 contain similar language and are rejected for the same reasons set forth above. Also, dependent claims 5, 7-11, 13-15, 20, 22-26, 28-30, 35, 37-41, and 43-45 are rejected as being dependent upon rejected base claims. For the purpose of further examination, the word "when" in the claim will be interpreted in the spirit of an abstract control flow as "where".

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1, 10-12, 16, 25-27, 31, and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over prior art of record U.S. Patent Number 6,314,558 to Angel et al. (hereinafter "Angel") in view of "Advanced Compiler Design and Implementation" by Muchnick (hereinafter "Muchnick").

In regard to claim 1, Angel discloses:

determining a set of probe locations in the application, (Column 3, lines 16-20), *wherein the set of probe locations comprises:*

a probe location at a beginning of a calling function, See column 22 lines 26-27:

> Processing begins at a step 442 where the **entry of the method is instrumented.** [emphasis added]

a probe location at an end of the calling function, See column 23 lines 10-13:

> If it is determined at the test step 458 that an exit point for the method has been reached, then control passes from the test step 458 to a step 460 where the **exit point is instrumented.** [emphasis added]

a probe location at a beginning of a first called function, See column 22 lines 26-27 as cited above.

a probe location at an end of the first called function, See column 23 lines 10-13 as cited above.

a probe location at a position in the calling function where the calling function calls the first called function, a probe location at a position in the calling function where the first called function returns after execution, See column 13 lines 48-51:

> **Function calls and returns may be instrumented** for a variety of purposes, including keeping track of variables becoming defined or undefined in connection with function calls and returns.

a probe location at a beginning of a second called function where the first called function calls the second called function, and See column 22 lines 26-27 as cited above.

...a probe location at a position in the calling function where the second called function returns after execution, See column 13 lines 48-51 as cited above.

wherein a pair of probe locations produces redundant information; eliminating one member of the probe location pair; and Angel discloses optimization of the placement of probes by way of eliminating locations that are within the "effective scope" of a parent block of code. See column 13 lines 9-15:

> One possible optimization is to not instrument scope changes that have minimal effect on monitoring variable operations. This optimization may be performed by first determining the scope of each portion of the IR code and then setting an effective scope of appropriate portions of the code to the effective scope of the immediately preceding block of code.

In other words, probe locations that have minimal effect on monitoring variable operations would provide redundant information, and can be eliminated from the set of locations to instrument.

inserting probes at the remaining probe locations in the application such that data collected relating to the execution of the application produces non-redundant information. See above citations.

Angel does not expressly disclose: *when the first called function calls the second called function and when the second called function returns to the calling function.* However, Muchnick describes an optimization called "tail merging" which detects redundant code and eliminates it. See section 18.8 on pages 590 and 591:

> What the optimization does is to replace the matching instructions of one of the blocks by a branch to the corresponding point in the other.

This optimization results in the second called function that returns directly to the calling function. It would have been obvious to one of ordinary skill to use Muchnick's tail merging with Angel's probe instrumentation in order to optimize code as suggested by Muchnick.

In regard to Claim 10, Angel teaches using the instrumentation to collect information relating to the execution of the application (Column 32, lines 60-67).

In regard to Claim 11, Angel discloses analysis of collected data (column 16 lines 37-47.

In regard to claim 12, all further limitations have been addressed in the above rejection of claims 1, 10, and 11.

Claims 16 and 31 are medium and computer arrangement claims that correspond with method Claim 1, and Claims 16 and 31 are rejected for the same reasons as Claim 1, where Angel teaches a medium (Figure 2) and computer arrangement (Figure 1) to carry out the method of Claim 1.

Claims 25 and 40 are claims that directly correlate with claim 10 and are rejected for the same reasons as Claim 10.

Claims 26 and 41 are claims that directly correlate with claim 11 and are rejected for the same reasons as Claim 11.

Claims 27 and 42 are medium and computer arrangement claims that correspond with method Claim 12, and Claims 27 and 42 are rejected for the same reasons as Claim 12, where Angel teaches a medium (Figure 2) and computer arrangement (Figure 1) to carry out the method of Claim 12.

9. Claims 5, 7, 13, 14, 20, 22, 28, 29, 35, 37, 43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Angel and Muchnick as applied in the above rejection of claim 1, and further in view of prior art of record Whygodny (U.S. Patent Number 6,282,701), prior art of record Miller (U.S. Patent Number 6,438,512) and prior art of record O'Donnell (U.S. Patent Number 6,374,369).

In regard to Claim 5, Angel does not teach that a first probe is configured to collect an address of the first and second called functions, a first stack pointer, and a first time indicator, and wherein a second probe is configured to collect the address of the second called function, a second stack pointer, and a second time indicator. Whygodny, however, does teach a method of monitoring and analyzing a computer program using tracing, where the trace data collected comprises "function calls (including the assembly address of the called function)" and "function return values (including function address)" (Column 29, lines 6-9). Whygodny does not teach collecting a stack pointer or a time

indicator. O'Donnell, however, does teach collecting starting and ending times before and after a function call (Column 1, lines 45-49). O'Donnell does not teach collecting a stack pointer. Miller, however, does teach monitoring a program's performance by periodically interrupting program flow, and calling a function that returns a stack (Column 3, lines 10-11). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the method of claim 1, further configure two probes for monitoring program performance, both probes collecting the addresses of the calling and called function as taught by Whygodny, a stack pointer as taught by Miller, and a time indicator as taught by O'Donnell, since gathering as much data as possible aids in better program analysis.

In regard to Claim 7, Angel does not teach that a first probe is configured to collect an address of the calling function, an address of the first called function, a first stack pointer, and a first time indicator, and wherein a second probe is configured to collect the address of the first called function, a second stack pointer, and a second time indicator. Whygodny, however, teaches a method of monitoring and analyzing a computer program using tracing, where the trace data collected comprises "function calls (including the assembly address of the called function)" and "function return values (including function address)" (Column 29, lines 6-9). Whygodny does not teach collecting a stack pointer or a time indicator. O'Donnell, however, does teach collecting starting and ending times before and after a function call (Column 1, lines 45-49). O'Donnell does not teach collecting a stack pointer. Miller, however, does teach

monitoring a program's performance by periodically interrupting program flow, and calling a function that returns a stack (Column 3, lines 10-11). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the method of claim 1, and further configure two probes for monitoring program performance, both probes collecting the addresses of the calling and called function as taught by Whygodny, a stack pointer as taught by Miller, and a time indicator as taught by O'Donnell, since gathering as much data as possible aids in better program analysis.

In regard to claim 13, the above rejection of claim 12 is incorporated. All further limitations have been addressed in the above rejection of claim 5.

In regard to claim 14, the above rejection of claim 12 is incorporated. All further limitations have been addressed in the above rejection of claim 7.

Claims 20 and 35 are medium and computer arrangement claims that correspond with method Claim 5, and Claims 20 and 35 are rejected for the same reasons as Claim 5, where Angel teaches a medium (Figure 2) and computer arrangement (Figure 1) to carry out the method of Claim 5.

Claims 22 and 37 are medium and computer arrangement claims that correspond with method Claim 7, and Claims 22 and 37 are rejected for the same reasons as Claim 7,

where Angel teaches a medium (Figure 2) and computer arrangement (Figure 1) to carry out the method of Claim 7.

Claims 28 and 43 are medium and computer arrangement claims that correspond with method Claim 13, and Claims 28 and 43 are rejected for the same reasons as Claim 13, where Angel teaches a medium (Figure 2) and computer arrangement (Figure 1) to carry out the method of Claim 13.

Claims 29 and 44 are medium and computer arrangement claims that correspond with method Claim 14, and Claims 28 and 43 are rejected for the same reasons as Claim 14, where Angel teaches a medium (Figure 2) and computer arrangement (Figure 1) to carry out the method of Claim 14.

10. Claims 8, 23, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Angel and Muchnick, and further in view of prior art of record Yellin (U.S. Patent Number 5,761,513).

In regard to Claim 8, Angel further shows placing instrumentation code in the presence of a 'throw' operation (Figure 18 and Column 25, lines 20-34). Angel does not show placing instrumentation code at the beginning and end of a block of code, where the block of code is where the application is directed to in the occurrence of an error. However, Yellin teaches that "an exception handler 100 is a procedure" and is "executed

whenever the applicable exception gets thrown during execution" (Column 1, lines 15-20). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to place instrumentation code at the beginning and end of the exception handing function as taught by Angel, where the exception handling function is a block of code to which execution of an application is directed upon in the occurrence of an error, since this would allow for the collection of data during an exception.

Claims 23 and 38 are medium and computer arrangement claims that correspond with method Claim 8, and Claims 23 and 38 are rejected for the same reasons as Claim 8, where Angel teaches a medium (Figure 2) and computer arrangement (Figure 1) to carry out the method of Claim 8.

11. Claims 9, 15, 24, 30, 39, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Angel, Muchnick and Yellin as applied to claim 8 above, and further in view of Whygodny, Miller, and O'Donnell.

In regard to Claim 9, Angel does not teach that the first probe is configured to collect an address of the block of code, a first stack pointer, and a first time indicator, and the second probe is configured to collect the address of the block of code, a second stack pointer, and a second time indicator. Whygodny, however, does teach a method of monitoring and analyzing a computer program using tracing, where the trace data collected comprises "function calls (including the assembly address of the called

function)" and "function return values (including function address)" (Column 29, lines 6-9). Whygodny does not teach collecting a stack pointer or a time indicator. O'Donnell, however, does teach collecting starting and ending times before and after a function call (Column 1, lines 45-49). O'Donnell does not teach collecting a stack pointer. Miller, however, does teach monitoring a program's performance by periodically interrupting program flow, and calling a function that returns a stack (Column 3, lines 10-11). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to perform the method of Claim 8, and further configure two probes for monitoring program performance, both probes collecting the addresses of the calling and called function as taught by Whygodny, a stack pointer as taught by Miller, and a time indicator as taught by O'Donnell, since gathering as much data as possible aids in better program analysis.

In regard to claim 15, the above rejection of claim 12 is incorporated. All further limitations have been addressed in the above rejection of claims 8 and 9.

Claims 24 and 39 are medium and computer arrangement claims that correspond with method Claim 9, and Claims 24 and 39 are rejected for the same reasons as Claim 9, where Angel teaches a medium (Figure 2) and computer arrangement (Figure 1) to carry out the method of Claim 9.

Claims 30 and 45 are medium and computer arrangement claims that correspond with method Claim 15, and Claims 30 and 45 are rejected for the same reasons as Claim 15, where Angel teaches a medium (Figure 2) and computer arrangement (Figure 1) to carry out the method of Claim 15.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to J. Derek Rutten whose telephone number is (571)272-3703. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (571)272-3695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jdr

TUAN DAM
SUPERVISORY PATENT EXAMINER